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| 10/587,795 | 07/31/2006 | Helmut Rembold | 3738 | 4039 |

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| EXAMINER |
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WILLOUGHBY, TERRENCE RONIQUE

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| ART UNIT | PAPER NUMBER |
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2836

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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|------------------------------|---|--|--|
| Office Action Summary | Application No. 10/587,795 | Applicant(s) REMBOLD, HELMUT | |
| | Examiner TERRENCE R. WILLOUGHBY | Art Unit 2836 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 November 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 July 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Amendment filed on November 13, 2008 has been entered. Accordingly claims 1, 3, 4, 5, 6 and 7 have been amended. No new claims were added. Claims 2, 8 and 9 were presently presented. Therefore, claims 1-9 remain pending in the present application. It also includes remarks/arguments.

Claim Rejections - 35 USC § 112

2. The 112 rejection is withdrawn based on the amendment and remarks filed.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-4 and 6-8 are rejected under 35 U.S.C. 102(b) as being anticipated by Thompson et al. (US 5,678,521).

5. Regarding claims 1 and 7, Thompson et al. discloses a method for controlling a solenoid valve (20), particularly in a motor vehicle, in a case of which a first voltage (i.e. boost vdc) is applied to a coil (20) of the solenoid valve (20) until a first point in time (T1), then a second voltage (i.e. notch Vdc) with a smaller effective value is applied,

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wherein the first point in time (T1) precedes a point in time at which the solenoid valve (20) reaches a final position (T2). See Fig. 20 and col. 36, ll. 61 thru col. 37, ll. 1-23.

Further, the reference discloses the control circuitry used to implement the injection solenoid driver circuitry (238) to open the injection control valve (20). The driver portion (238) includes an injection solenoid controller (202), a high side driver circuit (204), a current sensing circuitry (206), a low side driver circuitry (208), and a high voltage boost generation circuitry (240). The high voltage boost generation circuitry (240) uses a battery voltage (228) to generate a boost voltage output (246) that is supplied to the injection solenoid driver circuitry (238). See Fig. 2a and col. 15, ll. 30-65 and col. 16, ll. 40-65. In other words, the battery (228) terminals provide power to the driver portion (234) used to control the operations of the fueling of the fuel system. Furthermore, the reference discloses an alternative way to implement the control signals of the injection solenoid driver circuitry (238) to operate the injection control valve (20). The electrical control signals includes a high voltage boost signal, a high current solenoid pull-in signal and a low current solenoid holding signal (illustrated in Fig. 20, i.e. **boost vdc**, **notch vdc**, **hold**, which represents the first, second and third control voltages of the solenoid valve). The injection solenoid controller (202) of the driver portion (238) is programmed to perform the application of the electrical control signals as discussed above, which provides a pulse width modulating activating signal to the injector solenoid to maintain the current and voltage within a predetermined range (col. 17, ll. 14-51). See Fig. 2b and col. 36, ll. 61 thru col. 37, ll. 1-23. The second voltage (i.e. **notch vdc**) with a

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smaller effective value is realized by pulse-width modulating the first voltage (i.e. **boost vdc**) as discussed above using the injection solenoid controller (202).

6. Regarding claim 2, Thompson et al. discloses the method as recited in claim 1, wherein the second voltage (i.e. notch Vdc, from T1-T2) is at least so great in time that the final position of the solenoid valve is reached (col. 37, ll. 1-10).

7. Regarding claim 3, Thompson et al. discloses in (Fig. 20), the method as recited in claim 1. Further, Thompson et al. discloses the relationship of flux density (B) and the field intensity (H) to move the solenoid valve very quickly (see Fig. 18, and col. 36, ll. 37-49), while also avoiding core saturation (col. 36, ll. 50-65). Since the core saturation is avoided in the technique of using the boosting circuit which provides increased force levels and different voltage levels (col. 36, ll. 51-57 and col. 37, ll. 1-20), μ is assumed approximately constant (i.e. $\mu \cong \text{constant}$) in order to avoid core saturation as illustrated in (Fig. 18), therefore assuming μ is constant, the flux density (B) \cong (I) current based on equation: flux density (B) = $H \cdot \mu \cong \frac{I \cdot N}{L} \cdot \mu$,. Therefore, Thompson et al. in (Fig. 20, the second graph labeled (B), discloses after the time (T₁) an increase in (B) and therefore an increase in current while the second voltage (i.e. see Fig. 20, the first graph, from T₁ to T₂) is being applied.

8. Regarding claim 4, Thompson et al. discloses in (Fig. 20), the method as recited in claim 1, wherein starting at a point in time, a third voltage (i.e. from T₂ to T) is applied to the coil of the solenoid valve (see Fig. 19, (20)), the value of which is essentially equal to or less than that of the second voltage (i.e. from T₁ to T₂) and does not allow

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the current to increase further as compared with the second voltage (i.e. from T_1 to T_2).

As discussed in claim 3 above, the flux density (B) \cong current (I). Therefore, Thompson et al. discloses in (Fig. 20), the current not increasing from the third voltage (i.e. from T_2 to T).

9. Regarding claim 6, Thompson et al. discloses all the claim limitations recited above in claim 1.

10. Regarding claim 8, Thompson et al. discloses the method as recited in claim 7, wherein the points in time and the electrical voltages are stored in a program map as a function of operating variables (col. 18, ll. 34-39 and ll. 50-55 and col. 19, ll. 5-9).

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Thompson et al. (US 5,678,521) in view of Weber (US 5,381,297).

13. Regarding claim 5, Thompson et al. discloses the method as recited in claim 1, except for wherein starting at a third point in time, a fourth voltage is applied to the coil of the solenoid valve, an effective value of which is essentially less than the effective value of the third voltage such that a lesser current flows after time, the lesser current

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being at least so great that a minimum holding force of a fuel supply control valve is ensured.

Weber et al. in (Figs. 3-4), discloses starting at a third point in time (i.e. see Fig. 3, (24)), a fourth voltage (i.e. a negative voltage of -15 V) is applied to the coil of the solenoid valve, an effective value of which is essentially less than the effective value of third voltage (i.e. see Fig. 3, (23), which is a positive 12V), such that a lesser current flows after time (i.e. see Fig. 4, (23-24), the lesser current being at least so great that a minimum holding force of a fuel supply control valve is ensured (i.e. see Fig. 4, (23-24).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have incorporated the teachings of Weber et al. wherein a fourth voltage is applied to a coil of a solenoid valve of which is essentially less than that of a third voltage, and wherein the current is decreasing to a minimum value with the solenoid valve device as taught by Thompson et al. to effectively actuate the solenoid valve device with improved quickness.

14. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Thompson et al. (US 5,678,521) in view Coates et al. (US 6,807,947).

15. Regarding claim 9, Thompson et al. discloses the method of controlling a solenoid valve, expect for storing a computer program product with program code that is stored on a machine-readable storage device for carrying out the method as recited in Claim 1 when the program is run on a computer.

Coates et al discloses a method for controlling fuel/or pressure in an internal combustion engine comprising a computer program in the form of a computer program product having a program code for executing all steps of the method (col. 2, ll. 20-46).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have incorporated the teachings of Coates et al. in the solenoid valve device as taught by Thompson et al. so that the method according to claim is executable when the medium is integrated in a controller/ computer for an internal combustion engine of a motor vehicle.

Response to Arguments

16. Applicant's arguments with respect to claims 1-9 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

17. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

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extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TERRENCE R. WILLOUGHBY whose telephone number is (571)272-2725. The examiner can normally be reached on 8-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Elms can be reached on 571-272-1869. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Terrence R Willoughby/
Examiner, Art Unit 2836
4/21/09

/Fritz M Fleming/
Primary Examiner, Art Unit 2836